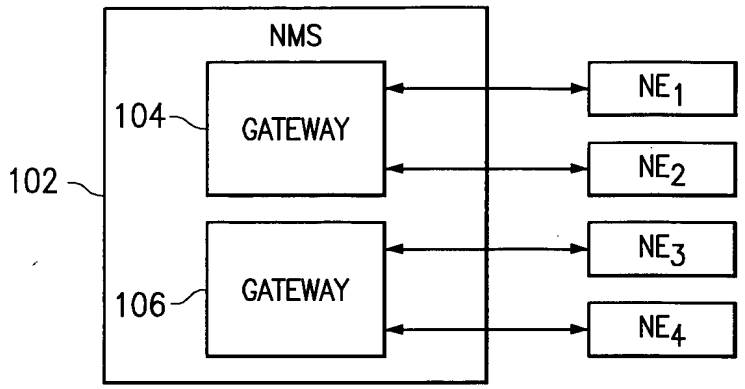
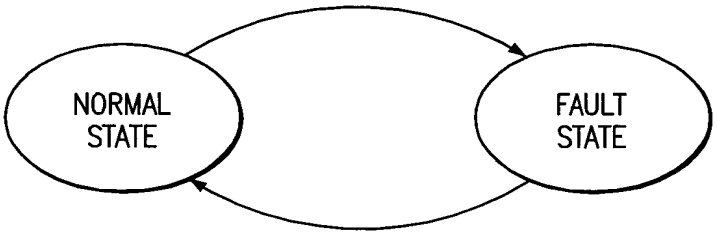


FIG. 1
(PRIOR ART)

200

TRANSITION	NORMAL TO FAULT
CONDITION(S)	IF PROCESSING ERROR OCCURS
ACTION(S)	ALERT USER, LOG DATA, AND DECREASE POLLING INTERVAL



TRANSITION	FAULT TO NORMAL
CONDITION(S)	IF PROCESSING ERROR RESOLVED
ACTION(S)	ALERT USER, LOG DATA, AND RESUME DEFAULT POLLING INTERVAL

FIG. 2
(PRIOR ART)

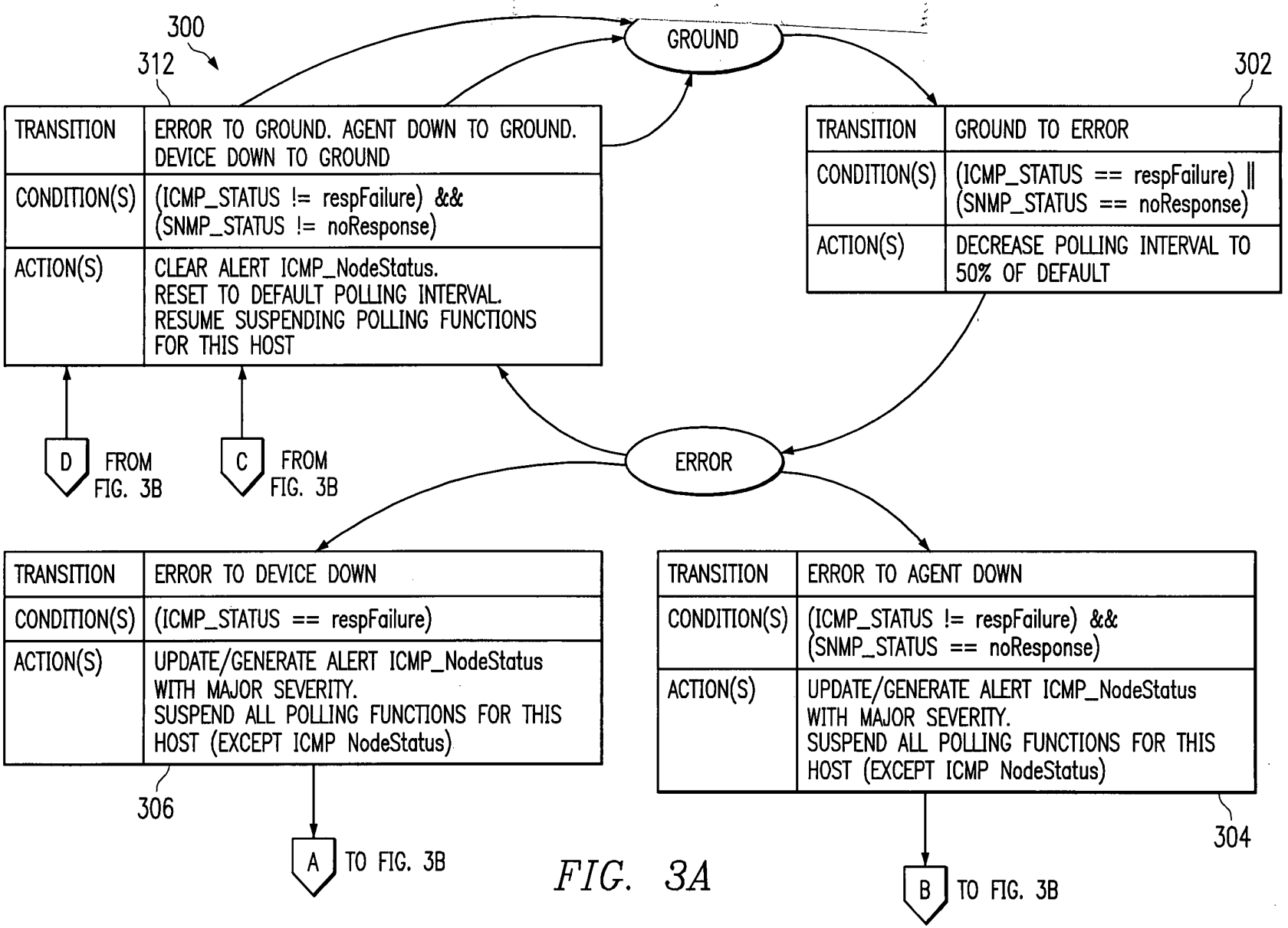

300
312
GROUND
302
TRANSITION
ERROR TO GROUND. AGENT DOWN TO GROUND. DEVICE DOWN TO GROUND
CONDITION(S)
(ICMP_STATUS != respFailure) && (SNMP_STATUS != noResponse)
ACTION(S)
CLEAR ALERT ICMP_NodeStatus. RESET TO DEFAULT POLLING INTERVAL. RESUME SUSPENDING POLLING FUNCTIONS FOR THIS HOST
TRANSITION
GROUND TO ERROR
CONDITION(S)
(ICMP_STATUS == respFailure) || (SNMP_STATUS == noResponse)
ACTION(S)
DECREASE POLLING INTERVAL TO 50% OF DEFAULT
D FROM FIG. 3B
C FROM FIG. 3B
ERROR
TRANSITION
ERROR TO DEVICE DOWN
CONDITION(S)
(ICMP_STATUS == respFailure)
ACTION(S)
UPDATE/GENERATE ALERT ICMP_NodeStatus WITH MAJOR SEVERITY. SUSPEND ALL POLLING FUNCTIONS FOR THIS HOST (EXCEPT ICMP NodeStatus)
306
A TO FIG. 3B
TRANSITION
ERROR TO AGENT DOWN
CONDITION(S)
(ICMP_STATUS != respFailure) && (SNMP_STATUS == noResponse)
ACTION(S)
UPDATE/GENERATE ALERT ICMP_NodeStatus WITH MAJOR SEVERITY. SUSPEND ALL POLLING FUNCTIONS FOR THIS HOST (EXCEPT ICMP NodeStatus)
304
B TO FIG. 3B

FIG. 3A

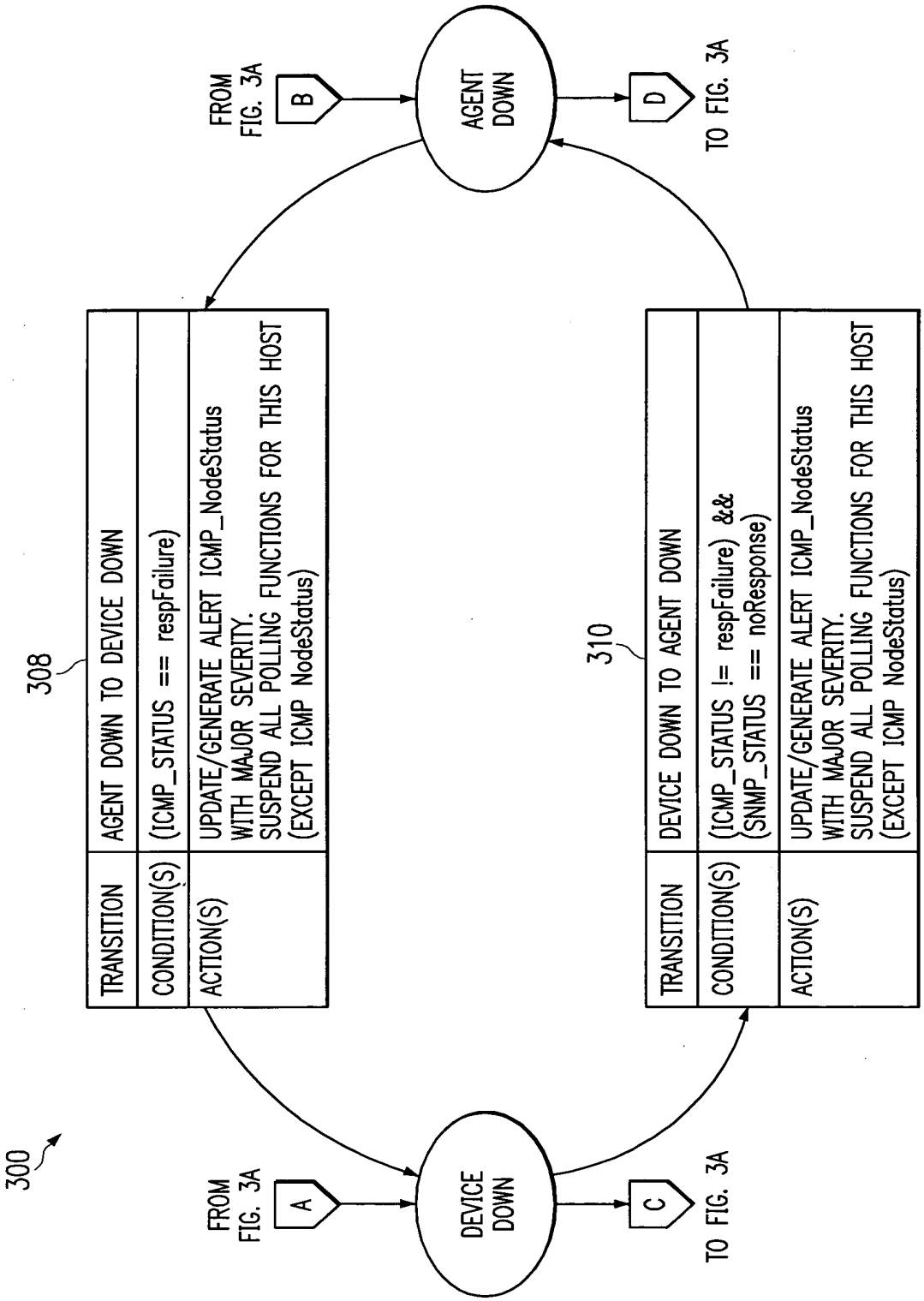

300
FROM FIG. 3A
A
DEVICE DOWN
C
TO FIG. 3A
FROM FIG. 3A
B
AGENT DOWN
D
TO FIG. 3A
308
TRANSITION
AGENT DOWN TO DEVICE DOWN
CONDITION(S)
(ICMP_STATUS == respFailure)
ACTION(S)
UPDATE/GENERATE ALERT ICMP_NodeStatus
WITH MAJOR SEVERITY.
SUSPEND ALL POLLING FUNCTIONS FOR THIS HOST
(EXCEPT ICMP NodeStatus)
310
TRANSITION
DEVICE DOWN TO AGENT DOWN
CONDITION(S)
(ICMP_STATUS != respFailure) &&
(SNMP_STATUS == noResponse)
ACTION(S)
UPDATE/GENERATE ALERT ICMP_NodeStatus
WITH MAJOR SEVERITY.
SUSPEND ALL POLLING FUNCTIONS FOR THIS HOST
(EXCEPT ICMP NodeStatus)

FIG. 3B

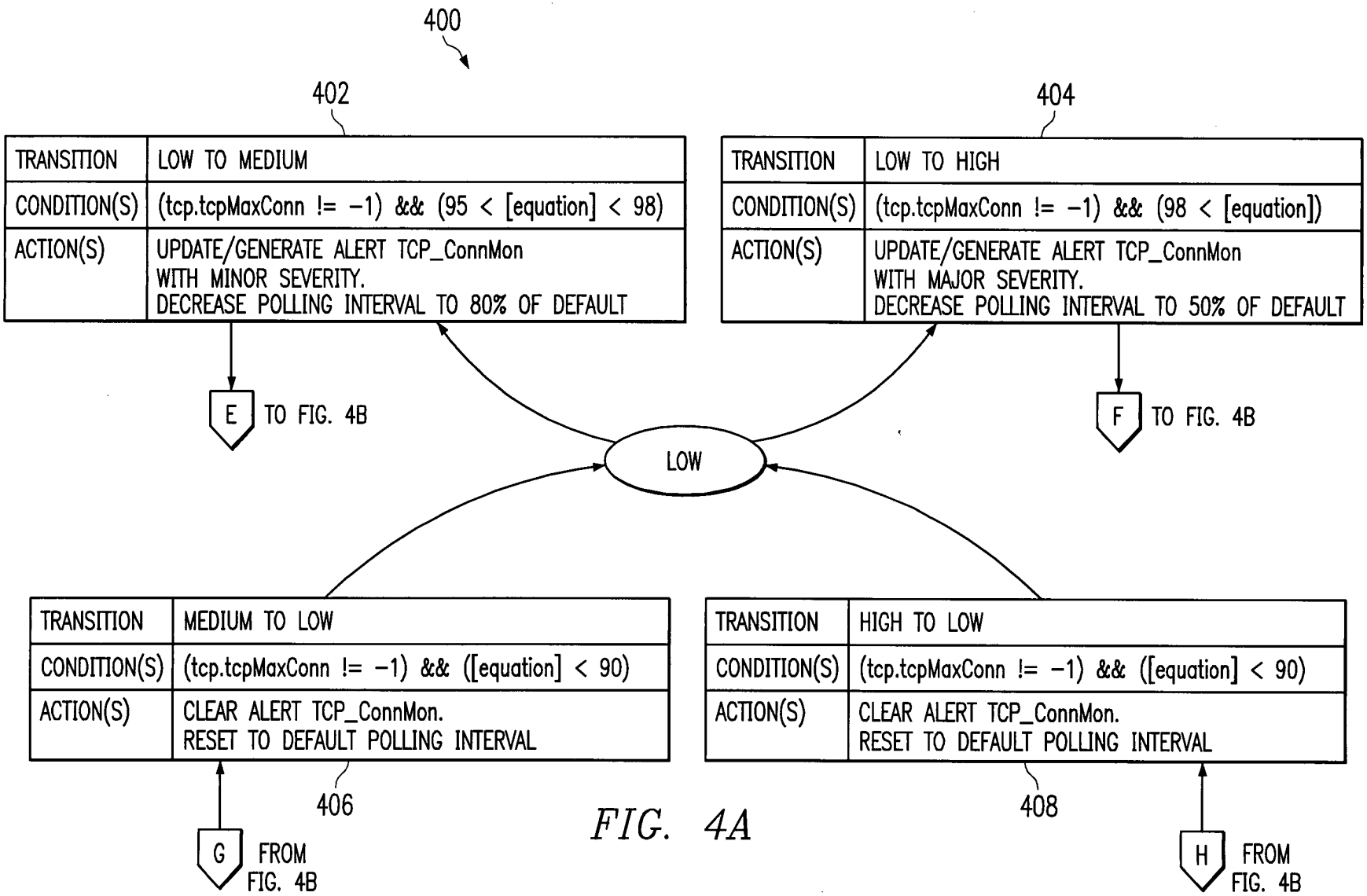

400
402
TRANSITION
LOW TO MEDIUM
CONDITION(S)
(tcp.tcpMaxConn != −1) && (95 < [equation] < 98)
ACTION(S)
UPDATE/GENERATE ALERT TCP_ConnMon
WITH MINOR SEVERITY.
DECREASE POLLING INTERVAL TO 80% OF DEFAULT
E
TO FIG. 4B
404
TRANSITION
LOW TO HIGH
CONDITION(S)
(tcp.tcpMaxConn != −1) && (98 < [equation])
ACTION(S)
UPDATE/GENERATE ALERT TCP_ConnMon
WITH MAJOR SEVERITY.
DECREASE POLLING INTERVAL TO 50% OF DEFAULT
F
TO FIG. 4B
LOW
TRANSITION
MEDIUM TO LOW
CONDITION(S)
(tcp.tcpMaxConn != −1) && ([equation] < 90)
ACTION(S)
CLEAR ALERT TCP_ConnMon.
RESET TO DEFAULT POLLING INTERVAL
406
G
FROM
FIG. 4B
TRANSITION
HIGH TO LOW
CONDITION(S)
(tcp.tcpMaxConn != −1) && ([equation] < 90)
ACTION(S)
CLEAR ALERT TCP_ConnMon.
RESET TO DEFAULT POLLING INTERVAL
408
H
FROM
FIG. 4B

FIG. 4A

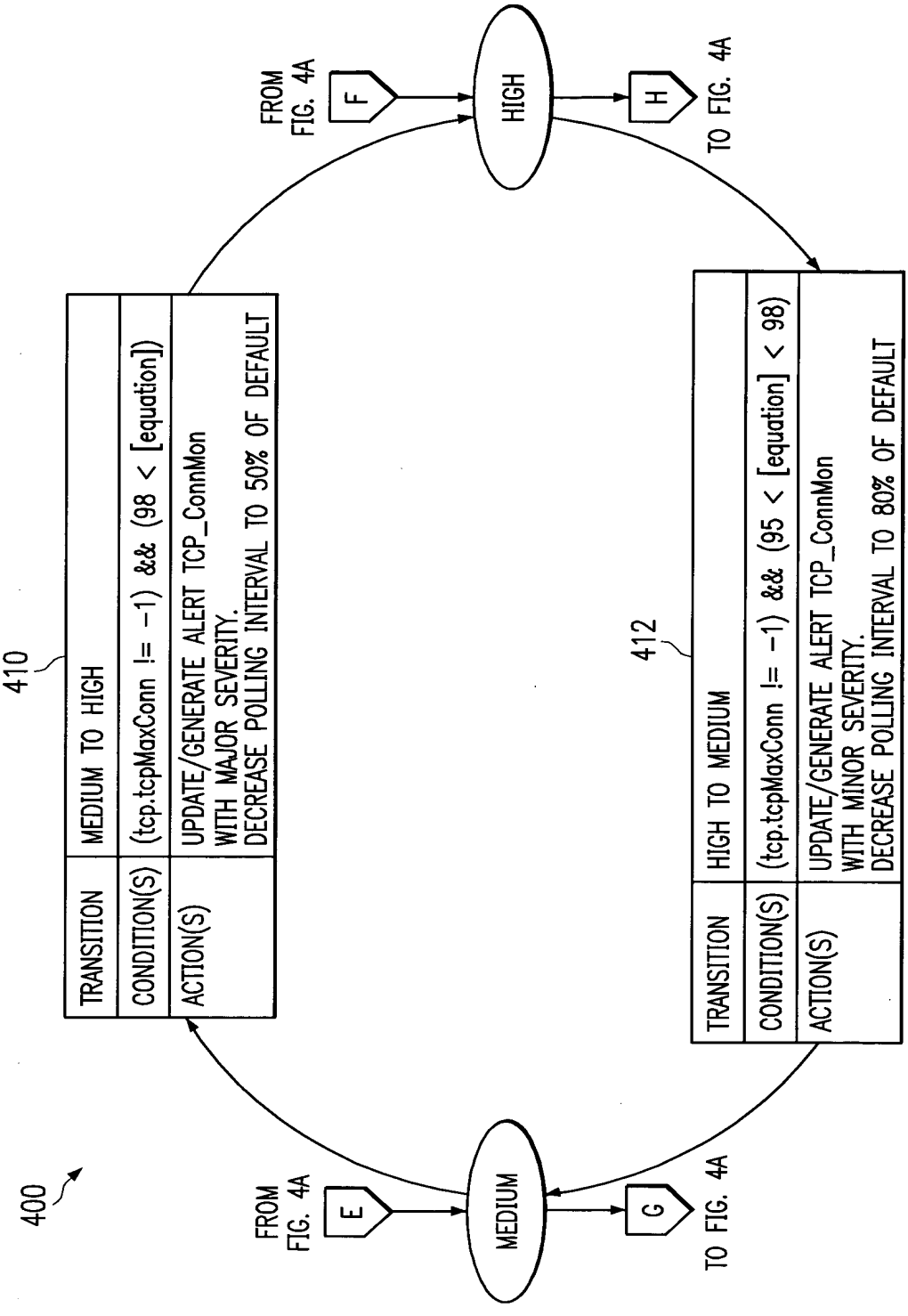

400
FROM FIG. 4A
E
MEDIUM
G
TO FIG. 4A
FROM FIG. 4A
F
HIGH
H
TO FIG. 4A
410
TRANSITION
MEDIUM TO HIGH
CONDITION(S)
(tcp.tcpMaxConn != -1) && (98 < [equation])
ACTION(S)
UPDATE/GENERATE ALERT TCP_ConnMon
WITH MAJOR SEVERITY.
DECREASE POLLING INTERVAL TO 50% OF DEFAULT
412
TRANSITION
HIGH TO MEDIUM
CONDITION(S)
(tcp.tcpMaxConn != -1) && (95 < [equation] < 98)
ACTION(S)
UPDATE/GENERATE ALERT TCP_ConnMon
WITH MINOR SEVERITY.
DECREASE POLLING INTERVAL TO 80% OF DEFAULT

FIG. 4B

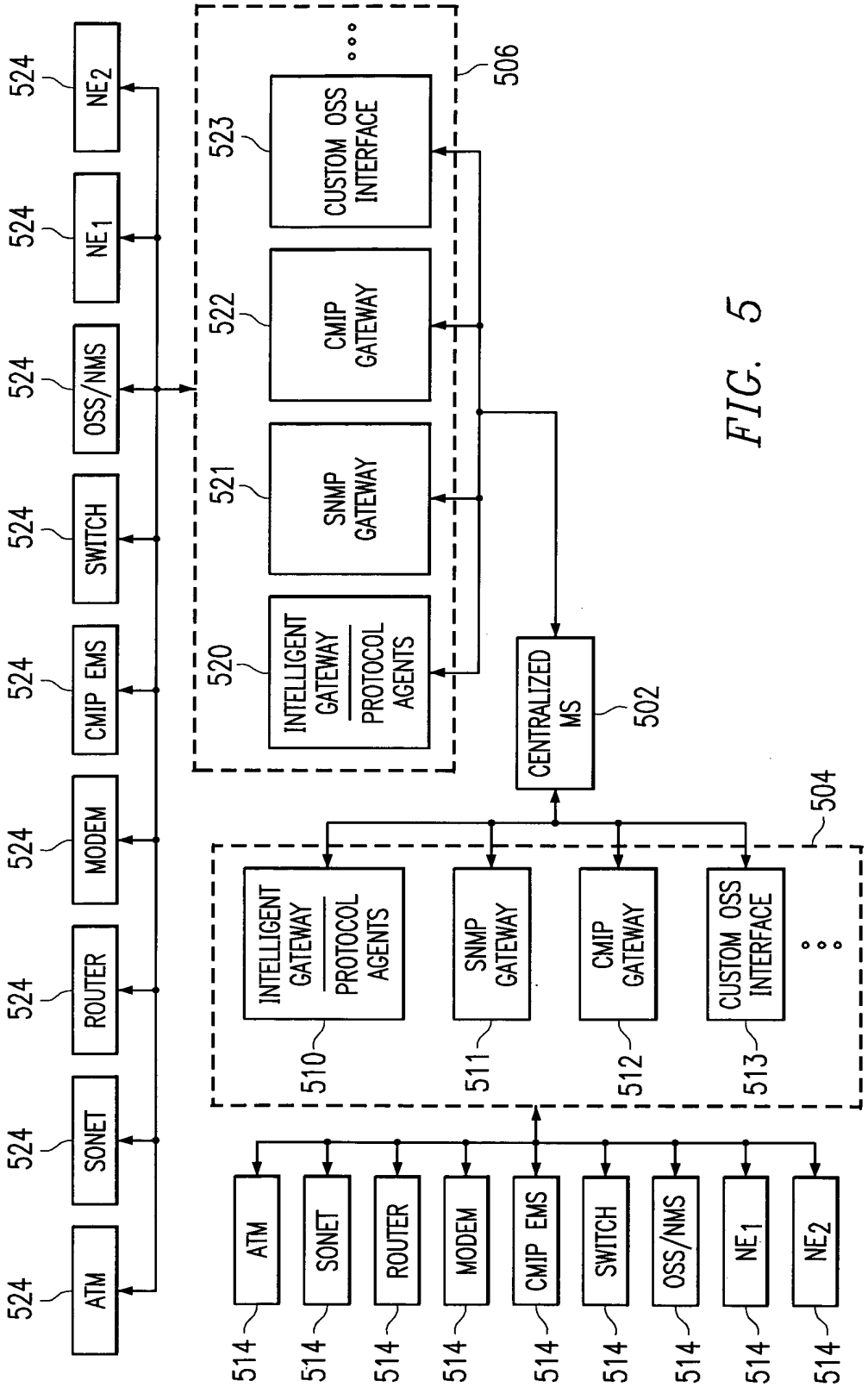

524
ATM
524
SONET
524
ROUTER
524
MODEM
524
CMIP EMS
524
SWITCH
524
OSS/NMS
524
NE1
524
NE2
506
520
INTELLIGENT GATEWAY / PROTOCOL AGENTS
521
SNMP GATEWAY
522
CMIP GATEWAY
523
CUSTOM OSS INTERFACE
CENTRALIZED MS
502
504
510
INTELLIGENT GATEWAY / PROTOCOL AGENTS
511
SNMP GATEWAY
512
CMIP GATEWAY
513
CUSTOM OSS INTERFACE
514
ATM
514
SONET
514
ROUTER
514
MODEM
514
CMIP EMS
514
SWITCH
514
OSS/NMS
514
NE1
514
NE2

FIG. 5

FIG. 6

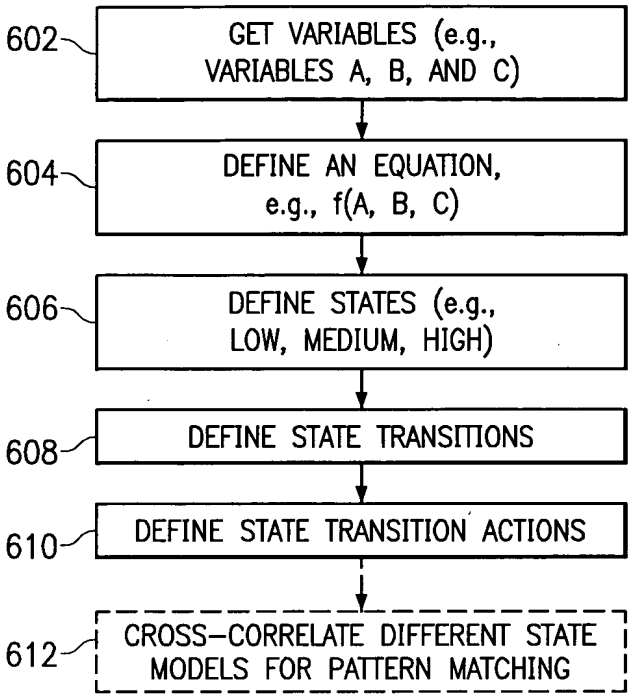

602
GET VARIABLES (e.g., VARIABLES A, B, AND C)
604
DEFINE AN EQUATION, e.g., f(A, B, C)
606
DEFINE STATES (e.g., LOW, MEDIUM, HIGH)
608
DEFINE STATE TRANSITIONS
610
DEFINE STATE TRANSITION ACTIONS
612
CROSS-CORRELATE DIFFERENT STATE MODELS FOR PATTERN MATCHING

FIG. 7A

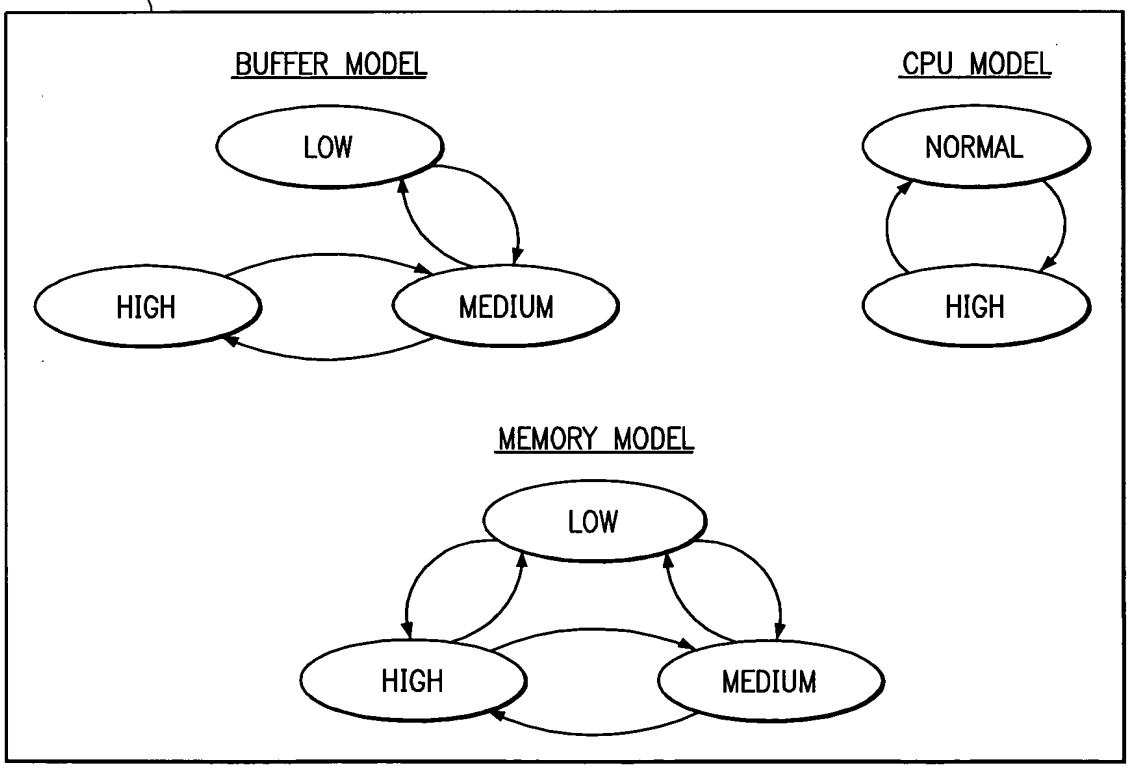

700
BUFFER MODEL
LOW
HIGH
MEDIUM
CPU MODEL
NORMAL
HIGH
MEMORY MODEL
LOW
HIGH
MEDIUM

FIG. 7B

PATTERN NAME	"PATTERN 1"
PATTERN CONDITION	IF (CPU STATE = HIGH AND MEMORY STATE = HIGH AND BUFFER STATE = MEDIUM)
ACTIONS	GENERATE ALERT WITH MINOR SEVERITY

FIG. 7C

PATTERN NAME	"PATTERN 2"
PATTERN CONDITION	IF (CPU STATE = HIGH AND MEMORY STATE = HIGH AND BUFFER STATE = HIGH)
ACTIONS	GENERATE ALERT WITH MAJOR SEVERITY. START SERVICES: ALLOCATE ADDITIONAL MEMORY RESOURCES AND ALLOCATE ADDITION CPU RESOURCES. STOP SERVICES: STOP APPLICATIONS TO PRESERVE

FIG. 8

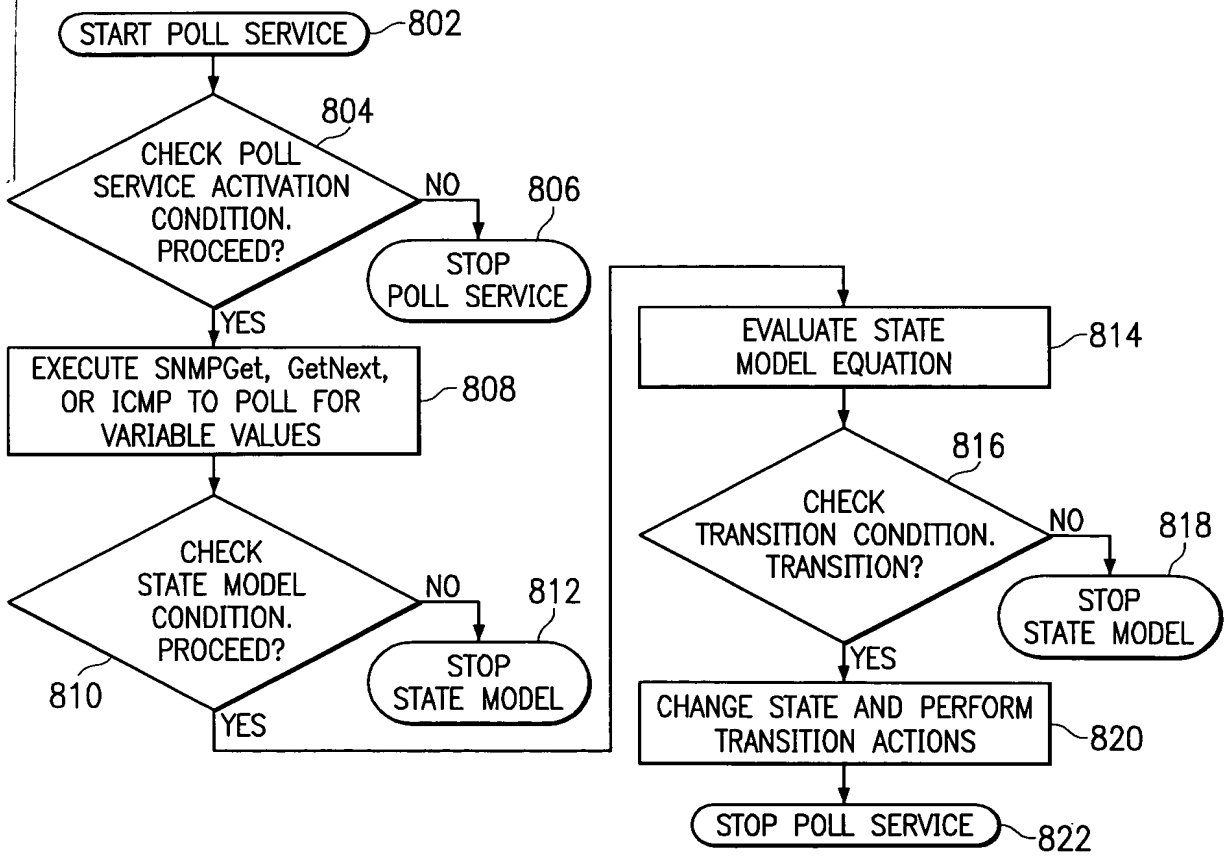


FIG. 9A

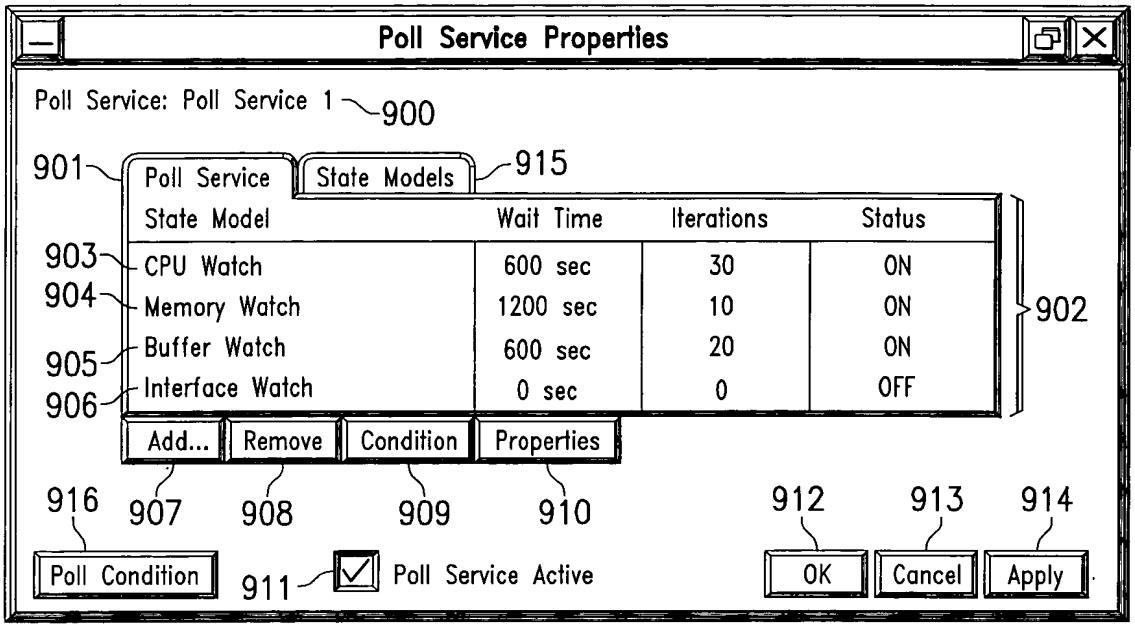

Poll Service Properties
Poll Service: Poll Service 1
900
901
Poll Service
State Models
915
State Model
Wait Time
Iterations
Status
903
CPU Watch
600 sec
30
ON
904
Memory Watch
1200 sec
10
ON
902
905
Buffer Watch
600 sec
20
ON
906
Interface Watch
0 sec
0
OFF
Add...
Remove
Condition
Properties
916
907
908
909
910
912
913
914
Poll Condition
911
Poll Service Active
OK
Cancel
Apply

FIG. 9D

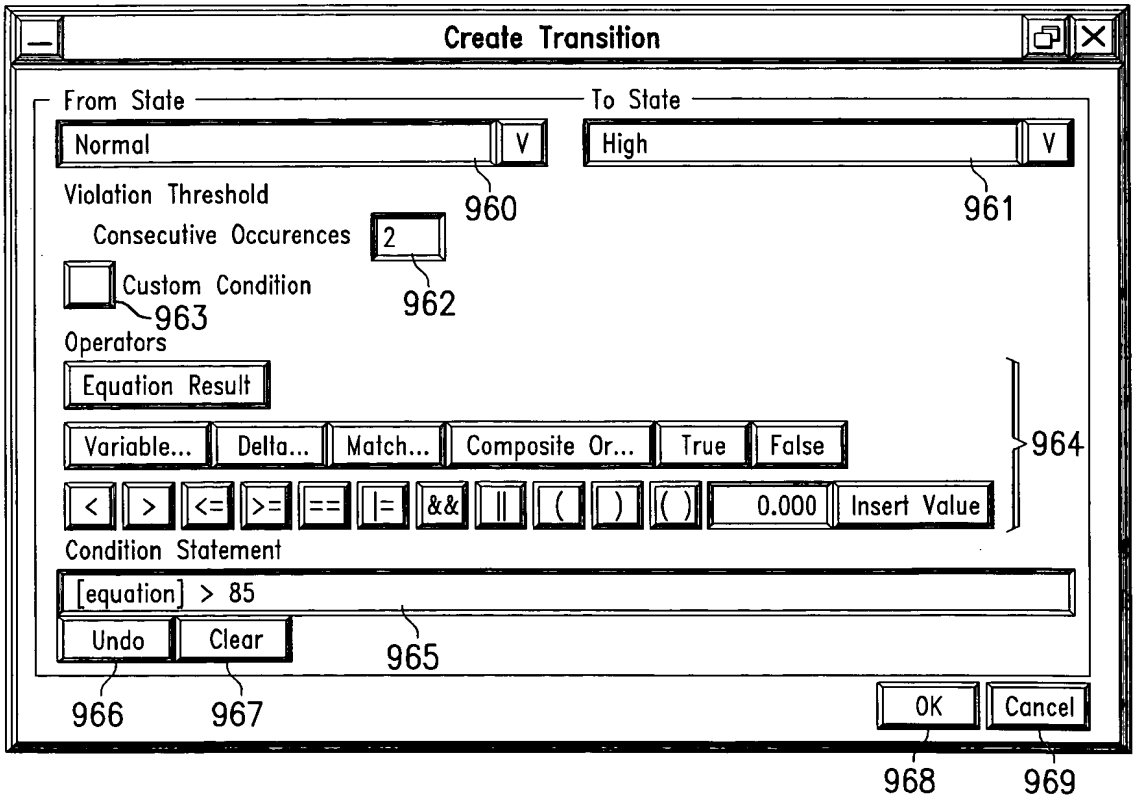

Create Transition
From State
To State
Normal
V
High
V
960
961
Violation Threshold
Consecutive Occurences
2
962
Custom Condition
963
Operators
Equation Result
Variable...
Delta...
Match...
Composite Or...
True
False
964
<
>
<=
>=
==
!=
&&
||
(
)
( )
0.000
Insert Value
Condition Statement
[equation] > 85
Undo
Clear
965
966
967
OK
Cancel
968
969

FIG. 9B

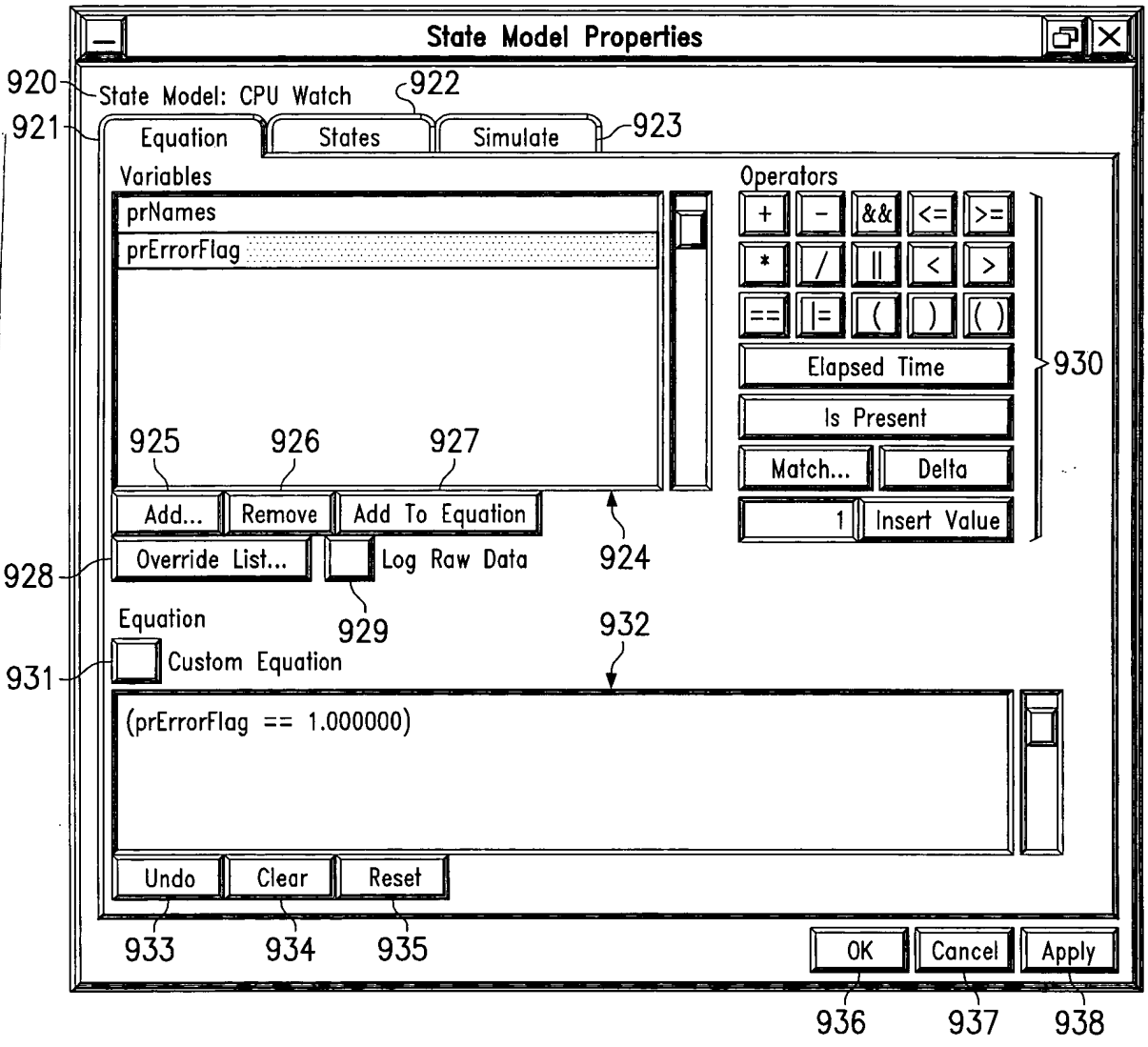

State Model Properties
920
State Model: CPU Watch
922
921
Equation
States
Simulate
923
Variables
prNames
prErrorFlag
Operators
+
-
&&
<=
>=
*
/
||
<
>
==
!=
(
)
( )
Elapsed Time
Is Present
Match...
Delta
1
Insert Value
930
925
926
927
Add...
Remove
Add To Equation
924
928
Override List...
Log Raw Data
929
Equation
932
931
Custom Equation
(prErrorFlag == 1.000000)
Undo
Clear
Reset
933
934
935
OK
Cancel
Apply
936
937
938

FIG. 9C

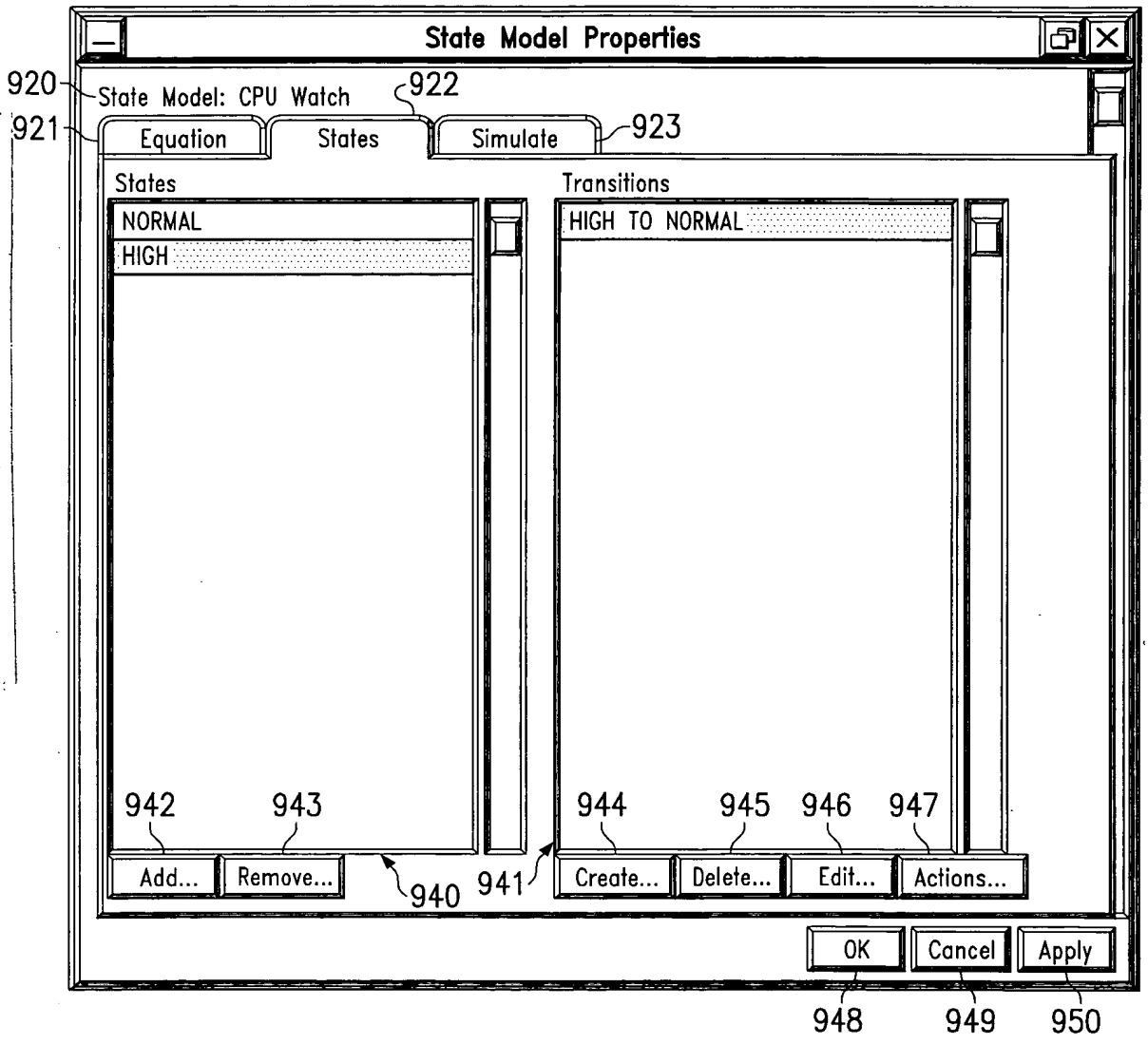
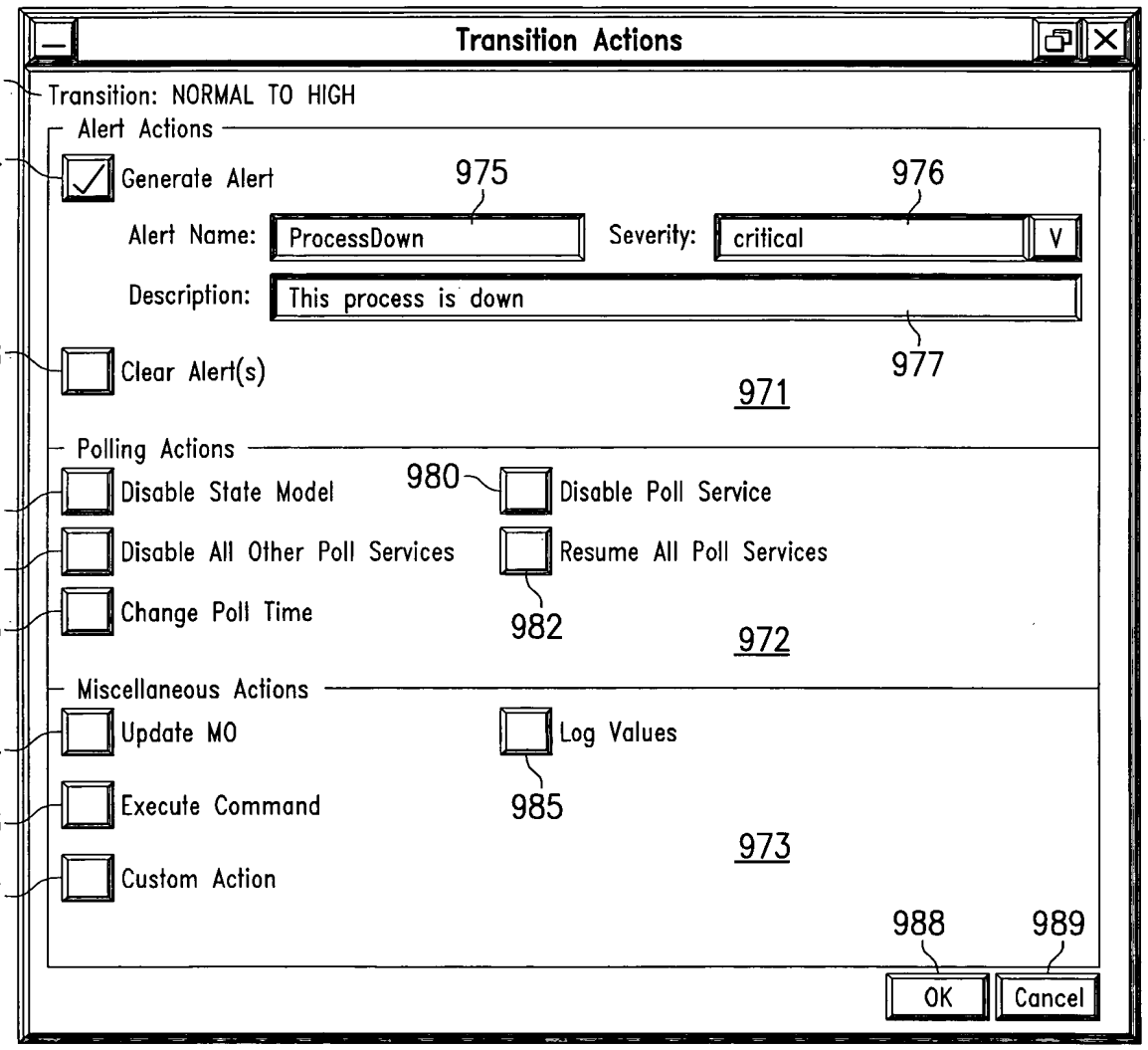

State Model Properties
920
State Model: CPU Watch
922
921
Equation
States
Simulate
923
States
Transitions
NORMAL
HIGH
HIGH TO NORMAL
942
943
944
945
946
947
Add...
Remove...
940
941
Create...
Delete...
Edit...
Actions...
OK
Cancel
Apply
948
949
950

FIG. 9E


Transition Actions
970
Transition: NORMAL TO HIGH
Alert Actions
974
Generate Alert
975
976
Alert Name:
ProcessDown
Severity:
critical
Description:
This process is down
977
978
Clear Alert(s)
971
Polling Actions
980
Disable State Model
Disable Poll Service
979
Disable All Other Poll Services
981
Resume All Poll Services
Change Poll Time
983
982
972
Miscellaneous Actions
Update MO
984
Log Values
985
Execute Command
986
973
Custom Action
987
988
989
OK
Cancel

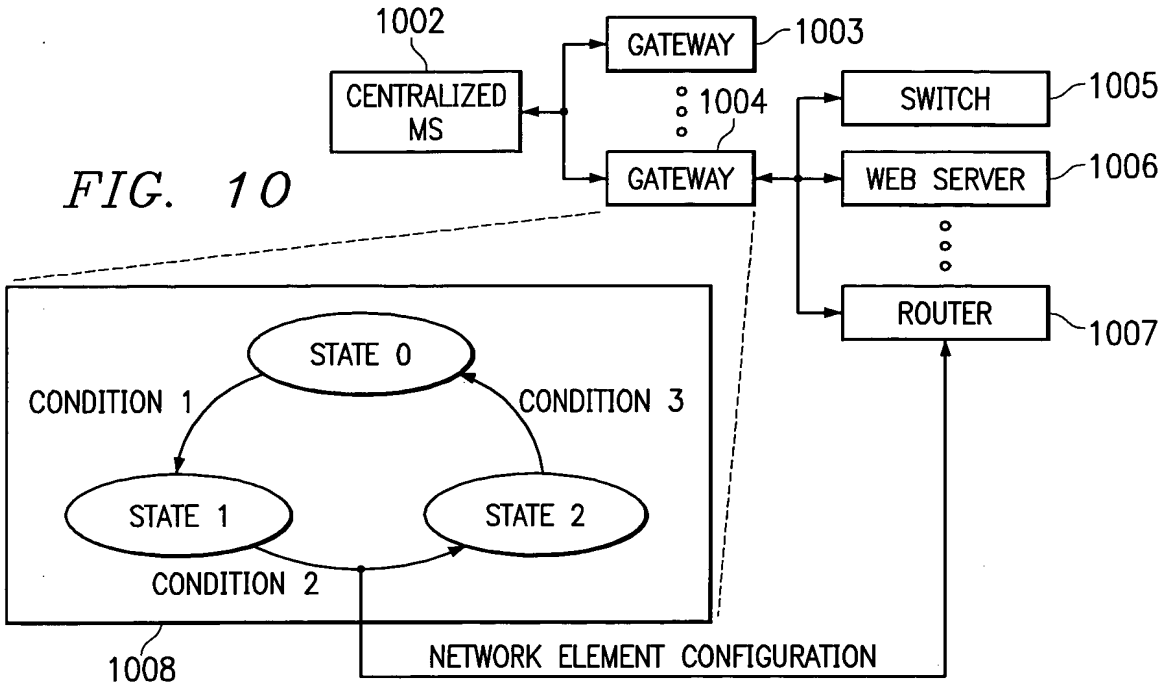


FIG. 10

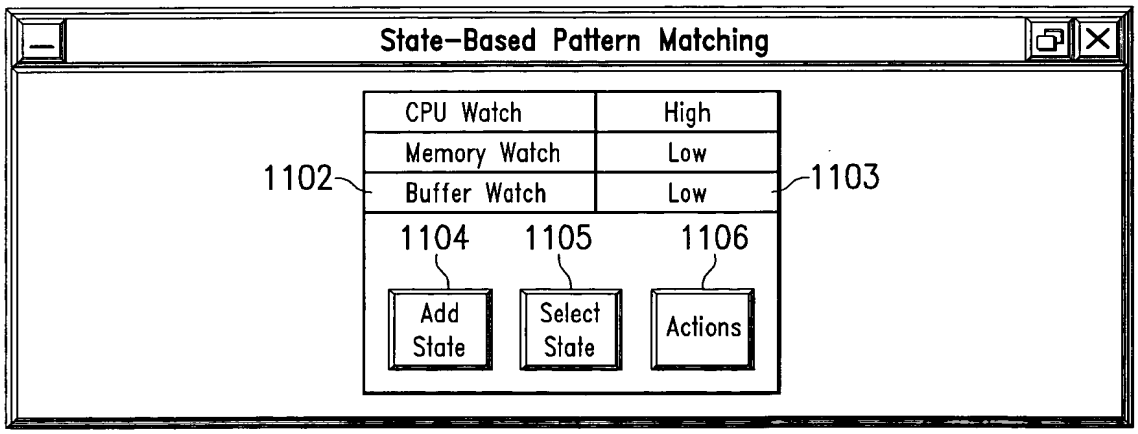


FIG. 11A

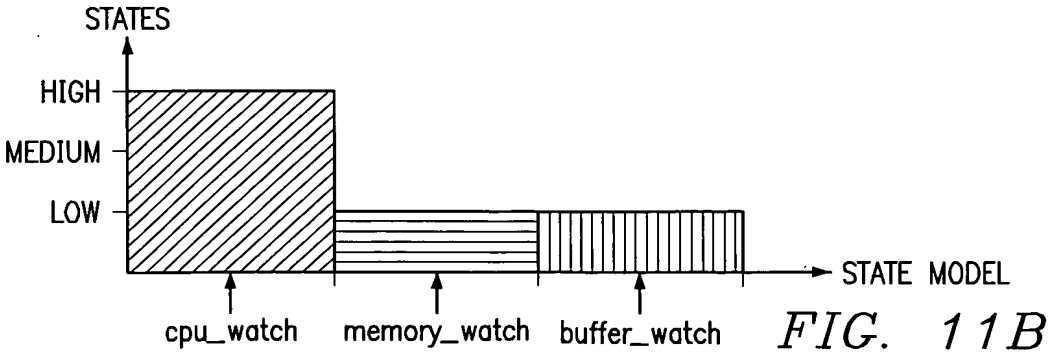


FIG. 11B